Building a Competency Taxonomy to Guide Experience Acceleration of Lead Program Systems Engineers

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Abstract

The goal for the initial phase of the systems engineering Experience Accelerator (ExpAcc) research project is to demonstrate the ability to leverage technology to accelerate the time it takes to mature a systems engineer. To demonstrate this goal, the ExpAcc team is developing a prototype simulator for demonstrating the ability to increase the learner's proficiency in a selected area of systems engineering competency. As an initial step in the project, a systems engineering competency taxonomy was built from a selected set of existing competency models combined with systems thinking research. The final competency taxonomy covers 87 unique competencies and includes a proficiency table based on the learner's level of self-assessed and demonstrated ability. This paper describes in detail the approach used to develop the competency model for the ExpAcc research project, and describes in more detail the primary areas, categories, subgroups, and individual capabilities, as well as the proficiency matrix, that together form the taxonomy.

Introduction

Due to a real-time shortage in systems engineers (Goncalves, 2010; NDIA SE Division, 2010; Squires and Cloutier, 2010), a flurry of activity to develop systems engineering competency models has occurred over the past decade (Squires, 2011; Ferris, 2010; Kasser, 2010). Government, industry and academia rely on these competency models to identify critical competencies of systems engineers. In particular, systems engineering competency models are becoming more widely developed and used in support of systems engineering workforce selection, development, education and training (Burke, et. al., 2000; Jansma and Jones, 2006; Verma, Larson, and Bromley, 2008; Menrad and Larson, 2008; Squires, Larson, and Sauser, 2010). In order to define a competency model for lead program/technical systems engineers in the acquisition

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14. ABSTRACT
The goal for the initial phase of the systems engineering Experience Accelerator (ExpAcc) research project is to demonstrate the ability to leverage technology to accelerate the time it takes to mature a systems engineer. To demonstrate this goal, the ExpAcc team is developing a prototype simulator for demonstrating the ability to increase the learner?s proficiency in a selected area of systems engineering competency. As an initial step in the project, a systems engineering competency taxonomy was built from a selected set of existing competency models combined with systems thinking research. The final competency taxonomy covers 87 unique competencies and includes a proficiency table based on the learner?s level of self-assessed and demonstrated ability. This paper describes in detail the approach used to develop the competency model for the ExpAcc research project, and describes in more detail the primary areas, categories, subgroups and individual capabilities, as well as the proficiency matrix, that together form the taxonomy.

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community, the Experience Accelerator (ExpAcc) research project chose to take advantage of existing competency model development efforts rather than develop a completely new model. The team combined the following three models into a single competency taxonomy as the guiding competency model for the project:

1) The Systems Planning, Research Development, and Engineering (SPRDE) Systems Engineering (SE) and Program Systems Engineer (PSE) competency model, known as the SPRDE-SE/PSE. (DAU, 2010)
2) The SERC Technical Lead Competency Model (Gavito, et. al, December, 2010)
3) A Critical/Systems Thinking Competency Model (Squires, 2007)

A summary of these models can be found in Appendix A. The final ExpAcc competency taxonomy has six primary groupings as shown in Figure 1, that are further divided into two to six competency areas that contain a total of 87 unique competencies. The model includes a proficiency table that measures the learner's proficiency level in each competency based on the complexity of the system being simulated and the learner's level of demonstrated ability to apply the competency for each level of complexity.

Background

The growing gap in systems engineering talent may be attributed to a combination of factors, including:

1) an increasing need for systems engineers, driven by such trends as:
   - increasing complexity in contemporary systems (Davidz, et. al. 2005; Goncalves, 2008; Kalawsky, 2009),
   - life extensions of legacy systems (Sireli and Mengers, 2009), and
   - a growing need for solving global sustainment challenges (Richmond, 1993: INCOSE Technical Operations, 2007); and
2) a depletion of systems engineers due to such trends as:
   - an aging and retiring baby boom generation, and
   - an historical decrease in the United States in the interest/graduates in Science, Technology, Engineering and Mathematics (STEM) fields in the generations following.

This gap has created an urgent need to accelerate the time to mature a systems engineer, and the ExpAcc research project is focused on demonstrating the feasibility of achieving this acceleration through the development of an engaging, realistic and authentic experiential-based simulator prototype.

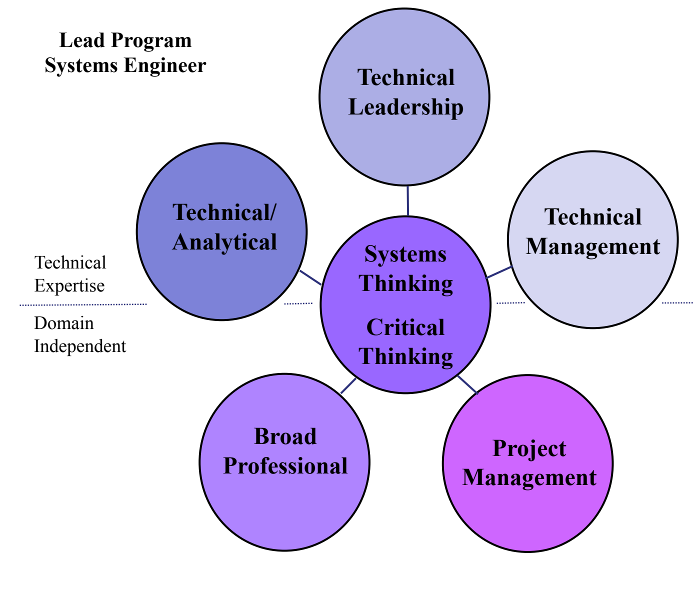

Figure 1. ExpAcc Competency Taxonomy

The ExpAcc Competency Taxonomy

One goal of the ExpAcc simulator is to increase the learner's level of systems engineering competency with each use. To address this, a baseline competency taxonomy was developed for use in identifying the total set of competencies being targeted. The developed competency taxonomy is based on a three-pronged approach. As shown in Figure 1, the backbone (shown in the center) of the model is systems and critical thinking. The second prong represented by the three upper circles in Figure 1, is technical expertise and comprises technical leadership, technical management, and technical/analytical skills as shown in Figure 2. The third prong shown in the two lower circles of Figure 1, and expanded in Figure 3, comprises project management and other broad-based professional competencies.

Systems and Critical Thinking

Systems thinking is the ability to think abstractly in order to:

- incorporate multiple perspectives;
- work within a space where the boundary or scope of problem or system may be "fuzzy";
- understand diverse operational contexts of the system;
- identify inter- and intra-relationships and dependencies;
- understand complex system behavior; and most important of all,
- reliably predict the impact of change to the system.

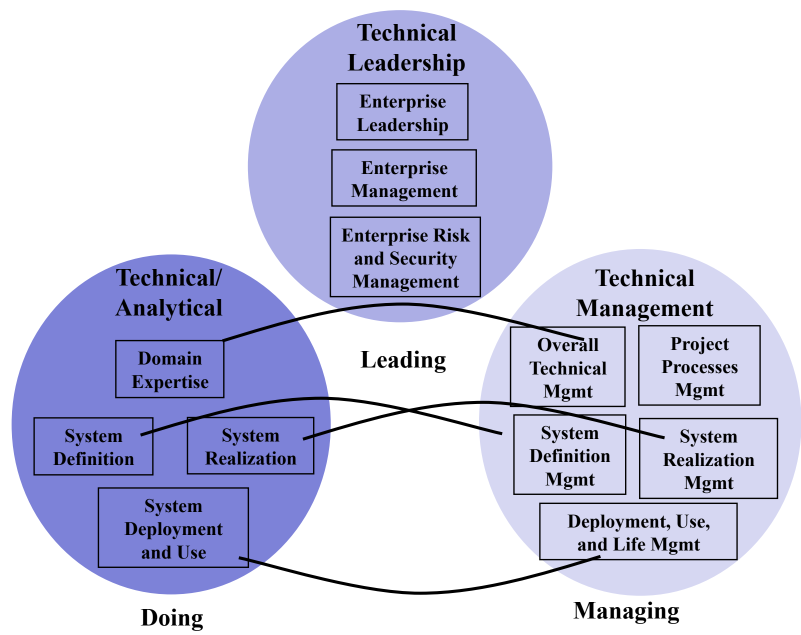

Figure 2: Technical Expertise

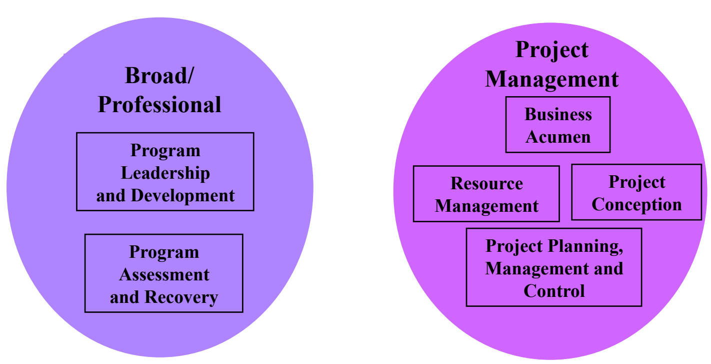

Figure 3: Domain Independent

Critical thinking refers to a rigorous analytical approach to thinking and in this model is comprised of strategic and essential thinking. Strategic thinking focuses on the long-term interests of the institution in a global environment. Essential thinking focuses on the ability to quickly narrow in on the concepts that are essential to the opportunity or solution at hand.

Technical Expertise

Technical expertise includes the three groups, each with three to five competency areas, shown in Figure 2. Technical Leadership includes areas needed to effectively lead the team in systems engineering activities. Technical Management focuses on managing systems engineering processes. Technical/Analytical skills includes those competencies necessary for implementing systems engineering.

Technical Leadership

Technical leadership pertains to competencies needed to direct the enterprise and includes specialty foci on risk, safety, physical and cyber security, and environment and ecology at the enterprise level. These areas are divided into the 9 individual competencies in Table 1.

Table 1. Technical Leadership Competencies

Technical Leadership	
Enterprise Leadership	Leading the Technical Enterprise
	Governance for the Technical Enterprise
Enterprise Management	Organizational Structure, Mission, Internal Goals
	Knowledge Capture, IP, Capture and Sharing
	International Standards and Political Implications
Enterprise Risk and Security	Risk Management Process
	Safety
	Physical and Cyber Security
	Environment and Ecology

Technical Management

Technical management addresses managing the system life cycle and project management processes with a focus on the technical aspects and includes the systems engineering management competencies. These areas are divided into the 29 individual competencies in Table 2.

Table 2. Technical Management Competencies

Technical Management	
System Definition Management	Stakeholder Expectations and Management
	Technical Requirements Definition and
	Interface Definition
	Concept of Operations (CONOPS)
	Systems of Systems (SoS) Architecture
	Concepts and Architecture
	Trade Studies
	Design Solution Definition
	System Environments
	Logical Decomposition
System Realization Management	Product Integration
	Product Verification
	Product Validation
System Deployment, Use and Life Management	Operations
	Product Transition
	Logistics Management
Project Processes Management	Technical Planning
	Technical Risk Management
	Technical Assessment
	Software Challenges, Solutions, Engineering
	Configuration Management
	Interface Management
	Process Assessment and Control
	Technical Data Management
	Technical Decision Analysis
	Quantitative Techniques
Overall Technical Management	PM/SE Procedures and Guidelines
	Systems Engineering Management
	Acquisition Phases Management

Technical/Analytical

Technical/Analytical includes competencies required to implement systems engineering across the systems life cycle. This competency area also covers the specialties and domain centric competencies. These areas are divided into the 16 individual competencies in Table 3.

Domain Independent

Project management and other broad-based professional competencies, are important for lead program system engineers. For this reason, these critical competency areas are included in the ExpAcc competency taxonomy. Table 4 lists the project management competencies, and Table 5 focuses on broad-based professional competencies.

Table 3.Technical/Analytical Competencies

Technical/Analytical	
Domain Expertise	Technical Discipline Expertise
	Domain Application Areas
	Domain Methods, Processes, and Tools
System Definition	Technical Basis for Cost
	Modeling and Simulation
	Safety Assurance
	Stakeholder Requirements Definition
	Requirements Analysis
	Architectural Design
System Realization	Implementation
	Integration
	Verification
	Validation
System Deployment and Use	Transition
	System Assurance
	Reliability, Availability, and Maintainability (RAM)

Competency Assessment

Competency assessment in the ExpAcc simulator begins with the learner's self-ratings of their proficiency. These self-ratings support skill development in two related ways. First, the assessment is prescriptive exposing learners to examples of effective behavior (Van Velsor and Leslie, 1991). They also establish a standard against which to provide learners with subsequent feedback on their actual performance in the ExpAcc and thereby to further focus and facilitate developmental goal setting (e.g., Carver & Scheier, 1981) For the prototype model, the team chose to focus initially on one competency: "Problem Solving and Recovery Approach." This competency comprises several important elements:

Table 4. Project Management Competencies

Project Management	
Resource Management	Technical Staffing and Performance
	Position Management
Business Acumen	Budget and Full Cost Management
	Capital Management
	Business Engineering
	External Relationships
	Integration of Technical Programs and Portfolios
	Lifecycle Perspective
	Management of Research and Development
Project Conception	Needs or Opportunity Management
	Project Proposal and Bid Management
	Requirements Management
	Acquisition Strategies, Procurements and Management
Project Planning, Management and Control	Project Review and Evaluation
	Resource Management
	Contract Management
	Project Planning
	Project Control
	Lifecycle Cost Estimating
	Tracking/Trending of Project Performance
	Information Technology/Management Information Systems
	Mission Assurance and Specialty Engineering

Table 5. Broad Professional Competencies

Broad/Professional	
Professional Leadership and Development	Leadership
	Communication
	Professional Ethics
	Mentoring and Coaching
	Team Dynamics and Management
	Multinational and Multicultural Issue
Program Assessment and Recovery	Review and Assessment Process
	Problem Solving and Recovery Approach
	Solution Definition and Lateral Thinking

- Identifying the actual /root cause problems amid often conflicting information.
- Marshalling the resources needed to solve problems.
- Recognizing the problems that have the most impact to the overall system and appropriately prioritizing plans for solving them.
- Making recommendations, using technical knowledge and experience, by developing a clear understanding of the system.
- Identifying and analyzing problems using a systems approach, weighing the relevance and accuracy of information, accounting for interdependencies, and evaluating alternative solutions.

Table 6 shows how the definition of that competency breaks out into 11 individual behavioral elements that can then be presented to the learner for self-assessment.

Table 6. Behavioral Statements for Self-Assessment

1. Self-Assessment: Problem Solving and Recovery Approach

This survey requires you to assess the extent to which you are confident in your effectiveness at performing several key behaviors pertaining to Problem Solving and Recovery Approach. First, read the definition below and then for each item in the survey choose the response that most accurately describes your confidence in your current level of effectiveness.

Problem Solving and Recovery Approach - Identifying the actual /root cause problems amidst often conflicting information. Marshaling the resources needed to solve problems. Recognizing the problems that have the most impact to the overall system and appropriately prioritizing plans for solving them. Making recommendations, using technical knowledge and experience, by developing a clear understanding of the system. Identifying and analyzing problems using a systems approach, weighing the relevance and accuracy of information, accounting for interdependencies, and evaluating alternative solutions.

Use the following definitions for the rating scale:
– Not at all Confident: I have very little competence or experience.
– Somewhat Confident: I have some competence but this is an important area for me to develop.
– Confident: My competence in this area is sufficient.
– Very Confident: This is a strength for me.

Please respond to the following statements with the rating that best reflects your current confidence level in each.

	Not at all Confident	Somewhat Confident	Confident	Very Confident
1. Ensuring that people openly share knowledge and information				
2. Creating a climate that enables others to feel safe raising questions or concerns				
3. Proactively seeking out new information and perspectives, rather than waiting for others to raise problems or concerns				
4. Remaining open to information that does not confirm your own views and assumptions (e.g. goes against the status quo or prevailing wisdom)				
5. Testing your own and other's assumptions				
6. Approaching problems from a systems perspective –one that recognizes independencies and relationships				
7. Recognizing potentially overlooked consequences of decisions and courses of action				
8. Avoiding premature closure–ensuring that problem causes and recovery options are sufficiently explored before settling on courses of action				
9. Using technical proficiency to identify and solve problems				
10. Changing direction based upon new knowledge and information				
11. Following through to ensure that changes are implemented properly				

Proficiency Scale

In future versions of the ExpAcc, the intent is for the user to progress - over time - to increasingly more complex situations (by level) in the simulation and from beginning to advanced stages of capability and understanding in each situational context. This is illustrated by the proficiency table shown in Table 7.

Table 7. Proficiency Level and Situation Complexity

	Proficiency Level				
Situation Complexity	None or Aware Only	Apply with Guidance	Apply	Manage or Lead	Advance State of Art
Exceptionally Complex					
Considerably Complex					
Complex					
Somewhat Complex					
Simple					

Conclusion

This paper described the approach used to develop the competency model for the ExpAcc research project, and describes the primary areas, categories, subgroups, and individual capabilities/behavioral statements, as well as the proficiency matrix, that together form the taxonomy. We have stressed the role the taxonomy has played in guiding the design of the ExpAcc simulator. We have also outlined how behavioral statements can be used in the operational model to enhance learning and developmental goal setting.

As the ExpAcc project continues we expect to learn more about how best to define, organize, and use competency models to accelerate system engineering proficiency. Some have argued that competency models can be overly prescriptive, driving users to think that there is one best way to get results (e.g., McCall, 2010, Hollenbeck, McCall & Silzer, 2006). To date our framework is driven more by a conceptual rather than empirically derived understanding of relevant systems engineering competencies. Data and information collected though the ExpAcc project will enable us to more closely examine the inter-relationships (e.g., factor structure) of the competencies we have identified and to ultimately refine this model to further enhance its accuracy and relevance as a planning and learning tool.

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Appendix A: Three Competency Models

Each of the competency models used to create the ExpAcc competency taxonomy is summarized in this appendix.

SPRDE-SE/PSE Competency Model

The SPRDE-SE/PSE competency model comprises 29 competency areas with 45 unique elements of competency defined. These are grouped according to three primary "units of competences" – analytical, technical management, and professional. The analytical unit covers 13 competencies related to the technical base for cost and aspects of the system life cycle. The technical management unit addresses 12 competencies focused on the technical side of project management. The professional unit covers the broader competencies of communication, problem solving, systems thinking and ethics (DAU, 2010)

SERC Technical Lead Competency Model

The SERC Technical Lead Competency Model includes 12 primary categories of competencies and 71 unique competencies; the 12 primary categories are (Gavito, et. al, December, 2010):

1. professional and leadership development
2. enterprise leadership and management
3. resource management
4. business acumen
5. risk and security
6. program assessment and recovery
7. project conception
8. project planning, management, and control
9. systems engineering thinking and perspective
10. technical management
11. production, product transition, and operations
12. technical acumen

The first 11 categories covered broad areas of systems engineering and technical leadership while the 12th category focuses on the specific technical discipline expertise and the associated domain.

Systems/Critical Thinking Competency Model

The systems/critical thinking competency model (Squires, 2007) is summarized within the section on Systems and Critical Thinking in the body of the paper.

References

Burke, G. D., Harrison, M. J., Fenton, R. E., and Carlock, P. G. "An approach to develop a systems engineering curriculum for human capital and process improvement." In *Proceedings of the 10Th Annual International Symposium, INCOSE 2000, Minneapolis, Minnesota, July 16-20, 2000.*

Carver, C.S. & Scheier, M.F. *Attention and self-regulation: A Control theory approach to human behavior*. New York: Springer-Verlag. 1981.

Davidz, H. L., Nightingale, D. J., and Rhodes, D. H. "Accelerating the development of senior systems engineers." In *Proceedings of the 15Th Annual International Symposium, INCOSE 2005,* Rochester, NY, USA, July 10-15, 2005.

Defense Acquisition University (DAU). SPRDE-SE/PSE competency model 4/14/10 version. https://acc.dau.mil/CommunityBrowser.aspx?id=315691&lang=en-US (accessed May 25, 2010).

Ferris, T. L. J. "Comparison of systems engineering competency frameworks." *In 4Th Asia-Pacific Conference on Systems Engineering (APCOSE 2010),* Keelung, Taiwan, October 4-6, 2010.

Gavito, V., Verma, D., Dominick, P., Pennotti, M., Giffin, R., Barrese, T., et al. "Technical leadership development program: Final technical report SERC-2010-TR-013." *Systems Engineering Research Center (SERC)*, Stevens Institute of Technology, Hoboken, NJ. December 13, 2010.

Goncalves, D. "Developing systems engineers." *Proceedings portland international conference on management of engineering & technology (PICMET) 2008,* Capetown, South Africa, July 27-31, 2008.

Hollenbeck, G.P. McCall, M.W. & Silzer, R.F. "Leadership competency models." *The Leadership Quarterly* , 17, 398-413. 2006.

INCOSE Technical Operations. "INCOSE-TP-2004-004-02: Systems engineering vision 2020, version 2.03." *International Council on Systems Engineering,* Seattle, WA. September, 2007.

Jansma, P. A. and Jones, R. M. " Advancing the practice of systems engineering at JPL." In *Aerospace Conference, 2006 IEEE.*

Kalawsky, R. S. "Grand challenges for systems engineering research." In *Proceedings of the 7Th annual conference on systems engineering research 2009, CSER 2009,* loughborough university, UK, april 20-23 2009.

Kasser, J, Frank, M, and Zhao, Y. Y. "Assessing the competencies of systems engineers." *In Proceedings of the 7Th Bi-Annual European Systems Engineering Conference (EUSEC),* Stockholm, Sweden, May 23-26, 2010.

McCall, M. W. "Recasting leadership development." *Industrial and Organizational Psychology: Perspectives on Practice and Science 3(1*), 3-19. 2010.

Menrad, R. and Larson, W. "Development of a NASA integrated technical workforce career development model entitled: Requisite occupation competencies and knowledge --the ROCK." *Presented at the 59Th International Astronautical Congress (IAC),* 29 September – 3 October, 2008, in Glasgow, Scotland.

NDIA SE Division. "Top systems engineering issues in department of defense and defense industry." (Final 9a-7/15/10). July, 2010.

Richmond, B. "Systems thinking: Critical thinking skills for the 1990s and beyond." *System Dynamics Review,* 9(2), 113-133. 1993.

Sireli, A. Y. and Mengers, C. A. "Need for change towards systems thinking in the U.S. Nuclear industry." *Systems Journal, IEEE,* 3(2), 239-253. 2009.

Squires, A. "Qualifying Exam: Systems Thinking and K12 Education." *Stevens Institute of Technology,* Hoboken, NJ. November, 2007.

Squires, A. "Investigating the Relationship of Online Pedagogy to Student Perceived Competency Knowledge Development in Systems Engineering Education." *Thesis, Stevens Institute of Technology, School of Systems and Enterprises*. Hoboken, NJ. 2011.

Squires, A. and Cloutier, R. "Developing a strategy to measure systems engineering competency knowledge demonstrated in the remote asynchronous online classroom." In *Proceedings of the 8Th annual conference on systems engineering research (CSER),* Stevens Institute of Technology, Hoboken, NJ, USA, March 17-19, 2010.

Squires, A., Larson, W. and Sauser. B. "Mapping space-based systems engineering curriculum to government-industry vetted competencies for improved organizational performance." *Systems Engineering* 13 (3): 246-260.

Van Velsor, E. and Leslie, J.B. " Feedback to Managers, Volume II: A Review and Comparison of Sixteen Multi-rater Feedback Instruments." *Center for Creative Leadership*, Greensboro, NC.1991.

Verma, D., Larson, W. and Bromley, L. "Space systems engineering: An academic program reflecting collaboration between government, industry and academia (open academic model)." *Presented at the 59Th International Astronautical Congress (IAC), 29 September – 3 October, 2008, in Glasgow, Scotland.*

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